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ON PLANS AND COORDINATION OF SCIENTIFIC RESEARCH ON THE  
MORPHOLOGY OF AGRICULTURAL ANIMALS  
FOR THE YEARS 1959-1965

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- USSR -

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Modern Problems of Morphology and Animal Husbandry

[Following is the translation of an article by S. N. Bogolyubskiy entitled "O Plane i o Coordinatsii Nauchnykh Issledovaniy po Morfologii Sel'skokhozyaystvennykh Zhivotnykh na 1959-1965 gg.," (English version above) in Arkhiv Anatomii, Gistologii, i Embriologii (Archives of Anatomy, Histology, and Embryology), Vol. 38, No. 5, May 1960, pages 124-126.]

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1. Studies of the morphology of agricultural animals must, first of all, be directed toward the implementation of the measures on animal husbandry outlined by the Party and Government for the Seven-Year Plan. This refers to the planned increase in the production of meat, dairy foods, wool, as well as to an increase in the fertility of agricultural mammals and the egg-laying capacity of fowl. The problems of morphology (anatomy, histology, and embryology) in the field of veterinary and zootechnology have much in common; their directions, however, are rather different. The common features consist in the detailed study of the anatomy, histology, and embryology of the most important agricultural varieties of cattle, sheep, and hogs. For many years, the study of the anatomy of the horse was the basis of our anatomical knowledge of agricultural animals. Today, to a considerable extent this field of study must be replaced by the study of the anatomy of the more vital forms. The veterinary trend in morphology is characterized by its close relation to such chairs as surgery, topographical anatomy, and therapy. The zootechnical trend, on the other hand, is closely related to the work of the chair of animal breeding and nutrition. Obstetric problems are essential to both trends; however, from the point of view of the laws of the dynamic forces of the transformation of species, the study of the development of embryos and fetuses is more closely related to the prob-

lems of zootechny than to those of veterinary science. Morphologists should render assistance in the animal husbandry production field. To this end, in addition to raising a healthy young generation and protecting it from diseases, a knowledge of the structure of the animals is required in the field of breeding. This knowledge should extend not only to the non-pedigree occasional material, but also to animals with a definite productivity: meat, dairy, and wool. Such forms exist in all the above-mentioned varieties. In this case, morphology will elicit the peculiarities of the constitution and productivity of the animals. Comparative morphology -- evolutionary, functional, and ecological -- is concerned with both aspects, although there are differences in scope. A knowledge of the comparative ontogenesis of various species in connection with the conditions of their existence is certainly essential for rational breeding and pedigree practices, it is this knowledge that allows us to determine the direction of the development. The aspect closest to the zootechnical direction is the problem of the domestication of animals, which has achieved great importance abroad. A report on this problem (S. N. Bogolyubskiy) was delivered at the 6th Congress of Anatomists, Histologists, and Embryologists (Kiev, 1958), and the importance of further work on this problem was stressed in the resolution of the Section on Agricultural Animals.

The problem of the constitution of agricultural animals has recently become even more important. However, scarcely any attention has been paid to it, despite the intimate relation obtaining between the animals' productivity, and their habits, constitution, and temper. This problem cannot, of course, be solved during the course of the Seven Year Plan, but it is necessary to pose it properly. In this respect, it would be particularly fruitful to relate this problem to the study of the human constitution.

2. In the implementation of multilateral studies on the constitution of agricultural animals, we must call attention to the presence of a close connection between the carrying out of practical tasks and the study of theoretical problems. It should be pointed out that as far back as the nineteenth century, Darwin stressed the fact of the great contribution which the study of domestic animals can make to the understanding of general evolutionary problems. Although there are many possibilities of this nature, we shall only cite some of those which can be posed in a large number of scientific morphological studies on all types of agricultural animals. These include: 1) The effect of insufficient or excessive feeding on embryos, fetuses, and young agricultural animals. According to the Chirvinskiy-Maligonov law, the

level of nutrition has a particularly strong effect on the intensively developing organs and parts of the body. This important law, still insufficiently clarified, is based on the law of the nonuniform growth of the parts and organs of the body in ontogenesis. This law should be one of the basic methods of the rational direction of development.

2) The development of the problem of reactivity in various species and breeds of agricultural animals at various stages of individual development, in relation to various environmental conditions. 3) The periodicity of individual development. 4) The clarification of the interrelation of methods and factors of transformations in the course of ontogenesis. 5) The study of the origin in ontogenesis of the pedigreed and productive properties of a quantitative and qualitative order. 6) The elicitation of the dynamics of the correlative connections between the forms of productivity and the structure of the bodies of the animals. 7) The variation limits of the constitution in the ontogenesis of various breeds. 8) The elucidation of the morphological characteristics of the adaptive properties of various breeds, as well as their cross-breeds with culture breeds, to the conditions of definite geographical landscapes.

The solution of these problems is organically connected with research work in the ontogenesis of various species and breeds in the field of the study of meat, milk, and wool-bearing properties, especially of fine-fleece breeds of sheep. In the field of the study of the fertility of agricultural animals, the connections between the structures of the gonads, genital apparatus, and cyclic ovulation, in various breeds under various maintenance conditions, are of great importance.

Complex studies can be of great value in the solution of these practical problems. Thus, specialists in the study of various systems of organs on definite objects (of the same type) should unite their efforts. For example, in the analysis of the histogenesis of the integumenta, it would be very desirable to obtain the participation of specialists of the peripheral nervous system and vascularization.

The efforts of morphologists should be directed toward the study of all organs in agricultural animals which have an important productive value in various rays. In this way, the application of conclusions can be observed in practice within the shortest possible period of time. Even such themes as the innervation and vascularization of the periosteum and bones, under the conditions of the analysis of animals of a definite constitution and productivity, would reveal many puzzling phenomena in their vital functions. In regard to the problem of meat productivity, study of the problems of the vascularization and innervation of muscles is clearly in-

dicated; a knowledge of the peculiarities of their structure and the interrelations between connective tissues and fatty layers, would undoubtedly help the practitioners in this field in the solution of the meat problem. The possibility is not excluded that morphologists should become engaged in the problem of the standardization of meat animals. We cannot believe that various constitutional types of meat animals can be equally useful in our diverse geographical landscapes.

3. There are only a few approved projects in the field of the morphological sciences in the Seven-Year Plan. But our Section has compared its inquiry data with the data on morphology for the past few years of the Ministry of Agriculture USSR and with the reports of the 6th Congress of Anatomists, Histologists, and Embryologists. This approach has enabled us to outline roughly the investigation trends, their coordination, and, in a number of cases, their complexity. The Seven-Year plans of the chair of Prof. A. I. Akayevskiy can serve as an example. His chair plans a study of the ontogenesis of the abdominal-wall arteries of domestic animals, the innervation of the mammary gland, and a complex theme on the anatomical characteristics of various sections of meat carcasses.

The chair of Anatomy of the Stavropol' Agricultural Institute plans the completion of a study of the blood-circulation system in sheep of the Caucasian Merino breed. At the chair of Anatomy and Histology of the Orenburg Institute a plan for the completion of the study of the circulatory system of cattle has been outlined. These chairs are headed by the students of Professor V. N. Zhedenov, Professor Yurkov, and Professor G. M. Udovin. The coordination of their work is logical. Zhedenov is completing a study of the "Laws of the Structure and Development of Lungs and Heart in Animals and Humans in the Light of Evolutionary Transformation." In this matter, special attention is being given to characteristics related to age and of breeding of the heart and lungs in agricultural animals in connection with the phenomenon of domestication.

Taking into account all that is known to us in anatomical theatics, we must note that in a number of important systems there are no scientific works, e. g., on the central nervous system, the endocrine system, the genito-urinary system. Moreover, only very little has been done on the gastro-intestinal system. There exist thorough morphological studies of other systems, as well as of general problems. The authors who have proved their value through these studies bear the responsibility of coordinating their directions and the evaluation of the corresponding dissertations. In the

study of histological problems, it is necessary to note the names of I. F. Ivanov, Z. S. Katsne'son, P. A. Koval'skiy; in production problems -- B. A. Gramenitskiy, I. F. Mokrov; in embryology -- G. A. Schmidt, A. V. Kvasnitskiy, A. I. Lopyrin; in breed ontogenesis -- S. N. Bogolyubskiy; in the constitution and species characteristics of animals -- F. M. Mukhamedgaliyev, V. N. Zhedenov, P. N. Vincogradov; in general integumenta and the development of the skin and wool -- N. A. Diomidova; in the study of the skeleton -- G. G. Vokken; in arthrology -- V. G. Kas'yanenko and S. F. Manziy; in musculature -- P. A. Glegolev; in the vascular system -- A. I. Akayevskiy, G. M. Udojin; in the heart and lungs -- V. N. Zhedenov; in the field of vegetative innervation -- T. I. Bogdanov; in the peripheral nervous system -- N. A. Vasnetsov.

In mentioning the above-mentioned researchers, we should point to the necessity of referring young workers to their chairs and laboratories for advanced training. In regard to the necessity of training and preparing specialists in other systems it is necessary to place before the ministries the problem of the formation of corresponding staff units and the assignments of curators from the available highly qualified anatomists. While the situation in regard to the morphological sciences is satisfactory at the veterinary faculties, the same cannot be said of the zootechnical faculties, especially those within the agricultural VUZ. It can be said that the science of morphology is being woefully neglected here. This can be seen from the fact that anatomy, histology and embryology are included in other chairs, while morphology has lost its specific status and plays almost no part in the training of future zootechnicians. The latter should be trained as future transformers of animal organisms and must thoroughly understand the theory and practice of transformation in the context of the entire complexity of the structure of an organism. It seems to us that this situation in morphology is partly the fault of the teachers-morphologists themselves. In the first place, they were not trained as future reorganizers of animal organisms, and they do not possess a thorough knowledge of the problems of breeding and nutrition, the technique of breeding, and the species characteristics and their age-related changes. They are therefore little help to the chairs of production and to production itself. There is no rational system in their training. The training of those who received a veterinary education, was directed toward mastering a number of veterinary sciences. But if they received their education at zootechnical faculties, the insignifant number of academic hours at these faculties assigned to anatomy, histology, and especi-

ally embryology, could not equip them with all the necessary knowledge. A complex should be created at the zootechnical faculties between morphological subjects and chairs of breeding and nutrition. This complex would consist of a detailed analysis of the most important organs of the animals. It would deal in the changes in these organs as a result of content, raising, and nutrition during the intra-uterine as well as postuterine development.

4. Among the measures which would contribute to the rationalization of scientific morphological studies, it is necessary to suggest the creation of sections in the morphology of agricultural and production animals at the large republics under the administration of their sections of anatomists, histologists, and embryologists. As an alternative, we might introduce into the administrations representatives of the morphology of animals. These sections or representatives would help the main section in mastering the data on the studies carried out in each institution. As the result of this policy, it would become possible to render concrete aid in the coordination and complexity of the studies, as well as to eliminate the duplication of studies. Thus, these studies would be employed for the benefit of science and production.

Regular conferences and symposia represent important measures. So far, two conferences have been planned for 1960. One, on individual development, is headed by the Institute of Morphology of Animals of the Academy of Science USSR; the other, on the methods of teaching the morphological disciplines, is headed by the Veterinary Academy. The Section of the Society is rendering active assistance in the organization of both planned conferences. The organization of the conferences will be in the form of symposia. It is expedient to arrange trips of highly qualified morphologists to a number of peripheral centers for aid and consultation. It is recommended, in the first place, to arrange for coordinated studies within the institutes, and, subsequently, to follow them up in conjunction with other institutes.

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